SECTION 8: FOOT CARE

Concern	Care/Test	Frequency
Foot Care	♦ Inspect feet, with shoes and socks off..... ♦ Perform comprehensive lower extremity exam	Each focused visit; stress need for daily self-exam Annually, with monofilament

Diabetes is the leading cause of lower limb amputations. It is estimated, however, that half of these amputations might be avoided through preventive foot care strategies. Peripheral neuropathy and peripheral arterial disease (PAD) are two common complications associated with diabetes mellitus. Both result in serious lower leg and foot complications that can cause morbidity, disability, and decreased quality of life. People with peripheral neuropathy and PAD are vulnerable to nerve and vascular damage that can result in loss of protective sensation in their feet, poor circulation, and poor healing. This vulnerability increases risk for foot ulcers, infection, and musculoskeletal deformities. The adoption of the following simple prevention strategies is crucial to reducing the rate of foot problems in people with diabetes:

- Self-management education for preventive foot care and glucose control.
- Routine, visual inspection and assessment of the feet by a medical provider during diabetes-related visits.
- Completion of an annual comprehensive foot exam (using a monofilament to assess sensory impairment and identify higher risk) by a medical provider.
- Early recognition of problems, prompt referral, and aggressive treatment by a multidisciplinary team.

Peripheral and Other Neuropathies

In both Type 1 diabetes and Type 2 diabetes, the prevalence of neuropathy varies with the duration and severity of hyperglycemia. Neuropathy is considered to be a progressive disease that affects sensory nerves and is evident several years after the onset of diabetes.

Sensory neuropathy results in the loss of protective sensation, affecting the toes and feet. This increases the risk of an injury or trauma, such as a sore, going undetected. Other neuropathies, such as autonomic neuropathy, can cause changes in nerves that control blood flow, perspiration, skin hydration, and possibly bone composition of the foot. Lack of skin hydration can cause cracking and fissures that lead to a portal of entry for microorganisms, causing infection. Changes in blood flow can lead to vasodilation and can shunt blood flow from the capillaries. This, in turn, may lead to bone demineralization and osteolysis, both of which contribute to foot deformity. Autonomic neuropathy can also impair the body's ability to respond to an inflammatory response, leading to skin ischemia, poor wound healing, and infection.

Peripheral Arterial Disease

Peripheral arterial disease (PAD) has been found in five percent of people with diabetes only one year after diagnosis. After follow-up in 12 years, this percentage increased to 23%. PAD is more likely to occur below the knee in people with diabetes because of inadequate blood supply (ischemia) to the lower limbs. The earliest sign of PAD is intermittent claudication. The Framingham Study found that 12% of males with diabetes had intermittent claudication compared to three percent in the control group. Pain usually begins in the calf and tends to

worsen with walking. People with PAD often also complain of cold feet. According to published studies, hyperglycemia, dyslipidemia, smoking, and high blood pressure are associated with subsequent development of PAD.

Routine and Comprehensive Foot Exams

Although neuropathy may be asymptotic and unrecognized, it is the single most important cause of ulceration. Identifying people at risk for foot complications is critical and involves the cooperation and vigilance of both the medical provider and the person with diabetes. According to other published studies, people who received foot self-management education and had a foot examination performed by a health professional were significantly more likely to regularly check their feet. All people with diabetes should receive an annual comprehensive exam and receive routine visual inspection of their feet at each diabetes-related visit (see Table 12). These foot exams can assist health care providers with the following:

- Early identification of risk.
- Early detection, diagnosis, and referral for problems.
- Early intervention and treatment to prevent problems from worsening.
- Teaching preventive foot care strategies.

Table 12: Differences Between the Routine and Comprehensive Foot Exam

Recommended Exam*	Exam includes*
Routine Visual Foot Check to be completed at each diabetes-related visit: • Detect the presence of acute problems • Reinforce importance of preventive foot health strategies	• Visual inspection of foot, heal, and between toes • Check for injury, calluses, blisters, fissures ulcer, and/or other unusual changes • Check for signs of decreased blood supply, and skin that is thin, shiny, fragile, or hairless • Inspect nails for thickening, ingrown corners, length, and fungal infection • Check socks or hose for discharge • Inquire about and check for appropriate footwear • Educate about self-care of the feet
Comprehensive Foot Exam to be completed annually: • Determine or re-evaluate person's risk status • Determine need for referral • Determine need for protective foot wear	• The use of a monofilament, the best choice to screen for clinically significant neuropathy; it is portable, inexpensive, painless, easy to administer, acceptable to the person, and provides good predictive ability for the risk of ulceration and amputation • Identify people at risk for foot problems and categorizing their level of risk • Identify current problems and changes since the last exam • Assessment or reassessment of musculoskeletal abnormalities or deformities, vascular and neurological status, skin, nail, and soft tissue changes • Assess foot and lower extremity pulses, gait, range of motion, and any necessary referrals • Exam serves as a baseline to compare with future screening • Develop a management plan • Educate about the importance of blood sugar control • Educate about self-care of the feet

* Exam is to be performed by health professionals knowledgeable and experienced in completing a routine visual exam and/or comprehensive exam

Risk Categorization

Upon completion of the comprehensive foot exam, risk category can be determined. A definition of "low risk" and "high risk" for recurrent ulceration and eventual amputation is provided in Table 13, along with the suggested minimal management guidelines. People identified as high risk may require a more comprehensive evaluation. Many other foot exam forms and risk categorization schemes exist.

Table 13: Risk Categories and Management Guidelines for Foot Care

Risk Category Defined	Management Guidelines
LOW RISK PEOPLE Having all of the following: • Intact protective sensation • Pedal pulses present • No deformity • No prior foot ulcer • No amputation	• Perform an annual comprehensive foot exam • Assess/prescribe appropriate footwear • Provide patient education for preventive self-care • Perform visual foot inspection at provider's discretion
HIGH RISK PEOPLE Having one or more of the following: • Loss of protective sensation • Absent pedal pulses • Foot deformity • History of foot ulcer • Prior amputation	• Perform an annual comprehensive foot exam • Perform visual foot inspection at every visit • Demonstrate preventive self-care of the feet • Refer to specialists and an educator as indicated (always refer to a specialist if charcot foot is suspected) • Assess/prescribe appropriate footwear. • Certify Medicare recipients for therapeutic shoe benefits • Place a "High Risk Feet" sticker on the medical record

Source: Feet Can Last a Lifetime: A Health Care Provider's Guide to Preventing Diabetes Foot Problems.

Ulceration

Peripheral neuropathy is the single largest cause of ulceration. Foot ulceration, in turn, is the single most prevalent precursor to lower extremity amputation among people with diabetes. Other risks include structural deformity, trauma, improperly fitted shoes, calluses, prior history of ulceration/amputation, prolonged pressures, limited joint mobility, hyperglycemia, duration of diabetes, loss of vision, end-stage renal disease, and advanced age. The assessment and treatment of foot ulcers is complex. Algorithm 3, included in this section, provides a summary of the important parameters for both assessment and treatment of foot ulcers.

Infection

Foot infections are a major cause for hospitalization of people with diabetes and almost always a factor in lower limb amputations. Foot infections are divided into non-limb-threatening and limb-threatening categories. The assessment and treatment of foot infections is complex. Algorithm 4, included in this section, provides a summary of the important parameters for both assessment and treatment of foot infections.

Charcot Foot

Charcot foot (neuropathic osteoarthropathy) is a progressive condition characterized by joint discoloration, pathologic fractures, and severe destruction of the pedal architecture. Charcot foot is associated with severe peripheral neuropathy and diabetes is the most common etiology.

Charcot foot is frequently dismissed as a sprain or strain, resulting in improper treatment and further weakening of foot condition. The assessment and treatment of charcot foot is complex. Algorithm 5, included in this section, provides a summary of the important parameters for both assessment and treatment of charcot foot.

Referral to a Specialist in Foot Care and Coordination of Care

Early recognition of problems, prompt referral, and aggressive treatment by a multidisciplinary team is necessary. Referrals to specialists, such as podiatrists, orthopedic or vascular surgeons, footwear specialists, or rehabilitation specialists, for co-management and consultation regarding foot care and treatment can help reduce the likelihood of more severe problems.

Essential Patient Education for Foot Care

People with diabetes can learn preventive foot care strategies for reducing the risk of complications. Educational strategies should take into consideration special educational or cultural needs and literacy level/skill, while respecting the individual's willingness to change behavior. Education may include, but is not limited to, the following:

- Emphasize optimal glycemic control, as this is an important factor in preventing and slowing neuropathy.
- Emphasize smoking cessation to decrease the risk of foot problems and vascular problems.
- Provide detailed foot care instruction (check feet daily or, if unable, ask a family member or friend) and review instruction at later visits. Instruct in proper footwear.
- Encourage people with diabetes to ask their health care provider to check their feet at every diabetes office visit.
- Encourage people with diabetes to contact their health care provider for early evaluation and treatment of all foot concerns.
- Emphasize the importance of adhering to recommendations and returning for regular follow-up care.
- Suggest and refer for pedorthic preventive care (e.g., extra depth shoes or inserts) as needed.
- Explain benefit of prescription foot wear/therapeutic shoes for prevention of foot complications.
- Discuss special care and educational strategies for people with visual and physical limitations.

Helpful Tools Included in this Section

- Algorithm 3 – Diabetic Foot Disorders ULCER: A Clinical Practice Pathway
- Algorithm 4 – Diabetic Foot Disorders INFECTION: A Clinical Practice Pathway
- Algorithm 5 – Diabetic Foot Disorders CHARCOT FOOT: A Clinical Practice Pathway
- Annual Comprehensive Diabetes Foot Exam Form
- Monofilament Application Instructions
- Shoes and Socks Off Poster – English
- Shoes and Socks Off Poster – Spanish
- High-risk Foot Stickers

Additional Resources

1) Feet Can Last a Lifetime: A Health Care Provider's Guide to Preventing Diabetes Foot Problems. Includes tools for diabetes foot exams, foot exam instructions, Medicare information, reference and resource materials, and patient education materials. Web site for pdf file located at: http://www.ndep.nih.gov/diabetes/pubs/Feet_HCGuide.pdf
2) Take Care of Your Feet for a Lifetime. An easy-to-read, illustrated patient booklet, available in English and Spanish, providing step-by-step instructions for proper foot care. Web site (English version) located at: http://www.ndep.nih.gov/campaigns/Feet/Feet_overview.htm. Web site (Spanish version) located at: http://www.ndep.nih.gov/campaigns/Feet/Feet_overview_Hisp.htm

Sensory testing monofilaments are available from:

- Lower Extremity Amputation Prevention (LEAP) Program (888) 275-4772
- The Center for Specialized Diabetes Foot Care (800) 543-9055
- Medical Monofilament Manufacturing, LLC (508) 746-7877
- North Coast Medical, Inc. (800) 821-9319
- Sammons Preston Rolyan (800) 558-8633
- You may also want to check with your local pharmaceutical representatives

Foot Care – Question and Answer

Q: Does Medicare cover special shoes for people with diabetes?

A: Medicare provides coverage for the following types of shoes: *Custom-molded shoes* – These are custom-made shoes, constructed over a positive model of the person's foot, and made of leather or other suitable material of equal quality. They must have removable inserts that can be altered or replaced as the person's condition warrants, and have some form of shoe closure. *Depth shoes* – These have a full-length removable insole that, when removed, provides a minimum of 3/16-inch additional depth throughout the shoe. Depth shoes must be made from leather or other suitable material of equal quality, have some form of shoe closure, and be available in full and half sizes with a minimum of three widths, according to the most recent American standard sizing schedule (i.e., the numerical shoe sizing system used for shoes sold in the United States). *Insert shoes* – These are total contact, multiple-density, removable inlays that are directly molded to the person's foot or made from a model of the person's foot. They must be made of a suitable material with regard to the person's foot condition. *Shoe modifications* – Modifications of custom-molded or depth shoes include, but are not limited to, rocker soles, metatarsal bars, wedges, flared heels, Velcro closures, and inserts or missing toes.

Coverage of footwear and inserts is limited to one of the following within one calendar year per eligible Medicare recipient: one pair of custom-molded shoes (including one pair of inserts provided with such shoes) and two additional pairs of inserts; or one pair of depth shoes and three pairs of inserts. Modifications of custom-molded or depth shoes can be substituted for a pair of inserts. Payment for the modifications may not exceed the limit set for the inserts.

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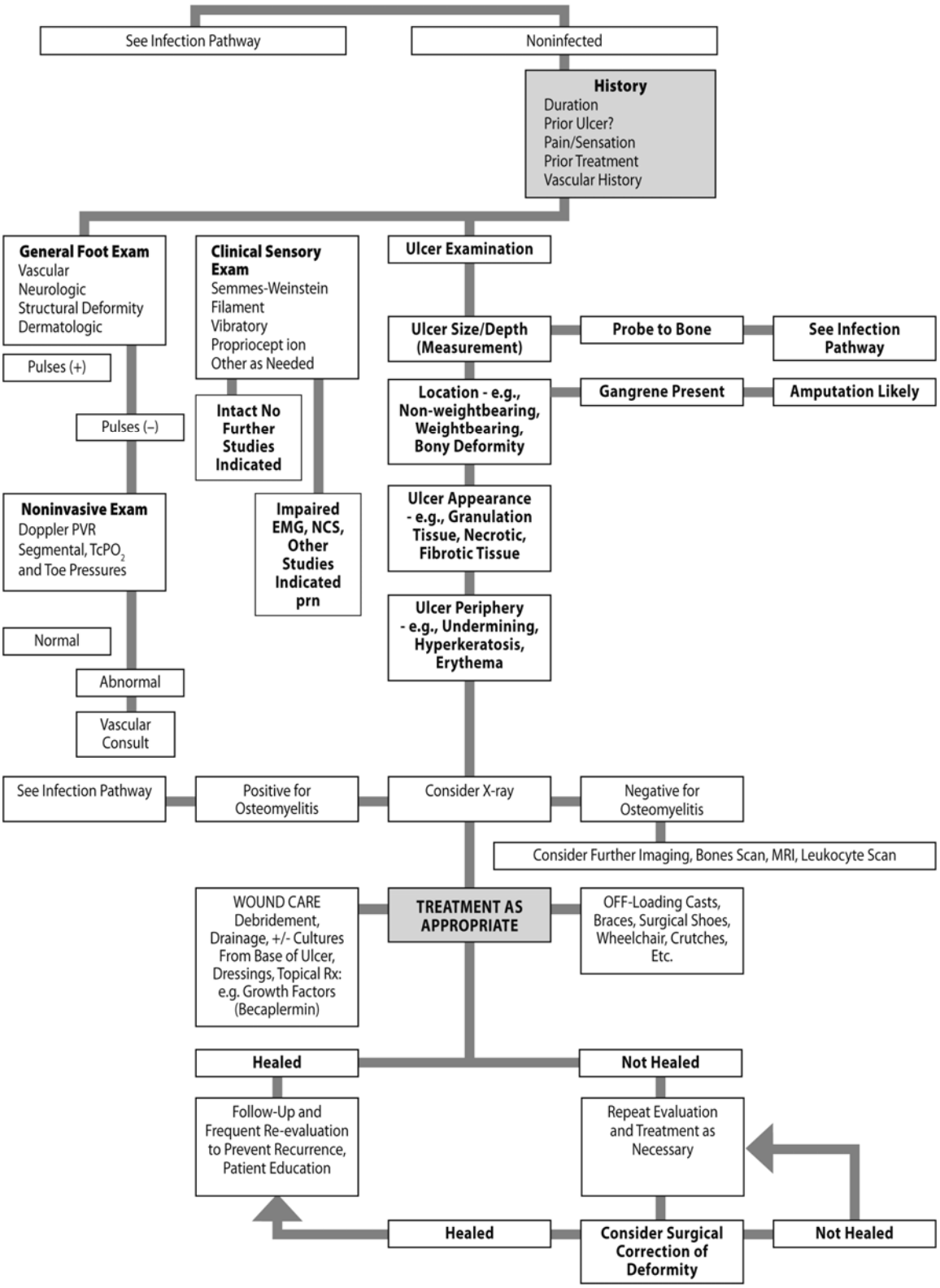
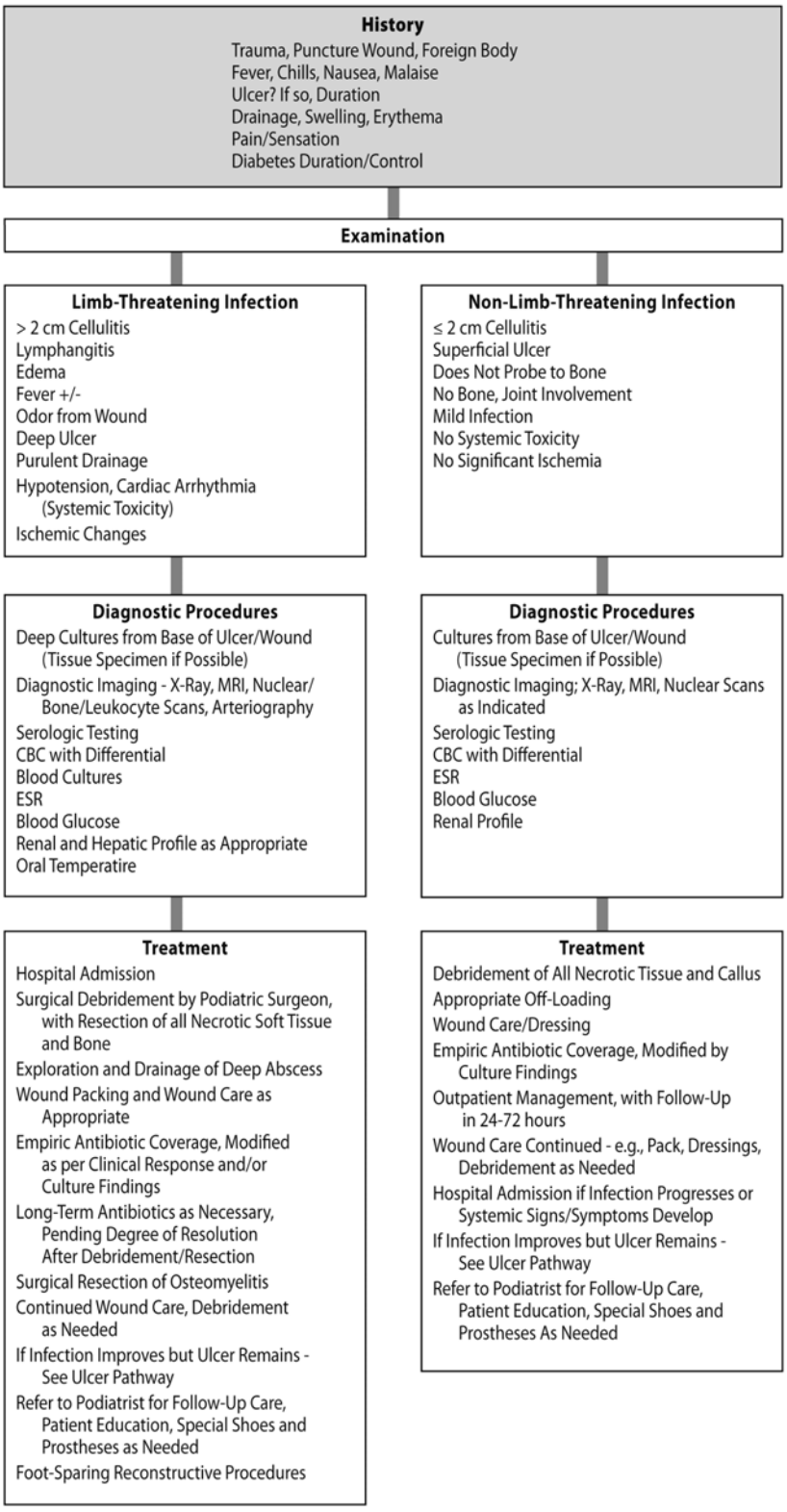
Algorithm 3

Diabetic Foot Disorders ULCER: A Clinical Practice Pathway



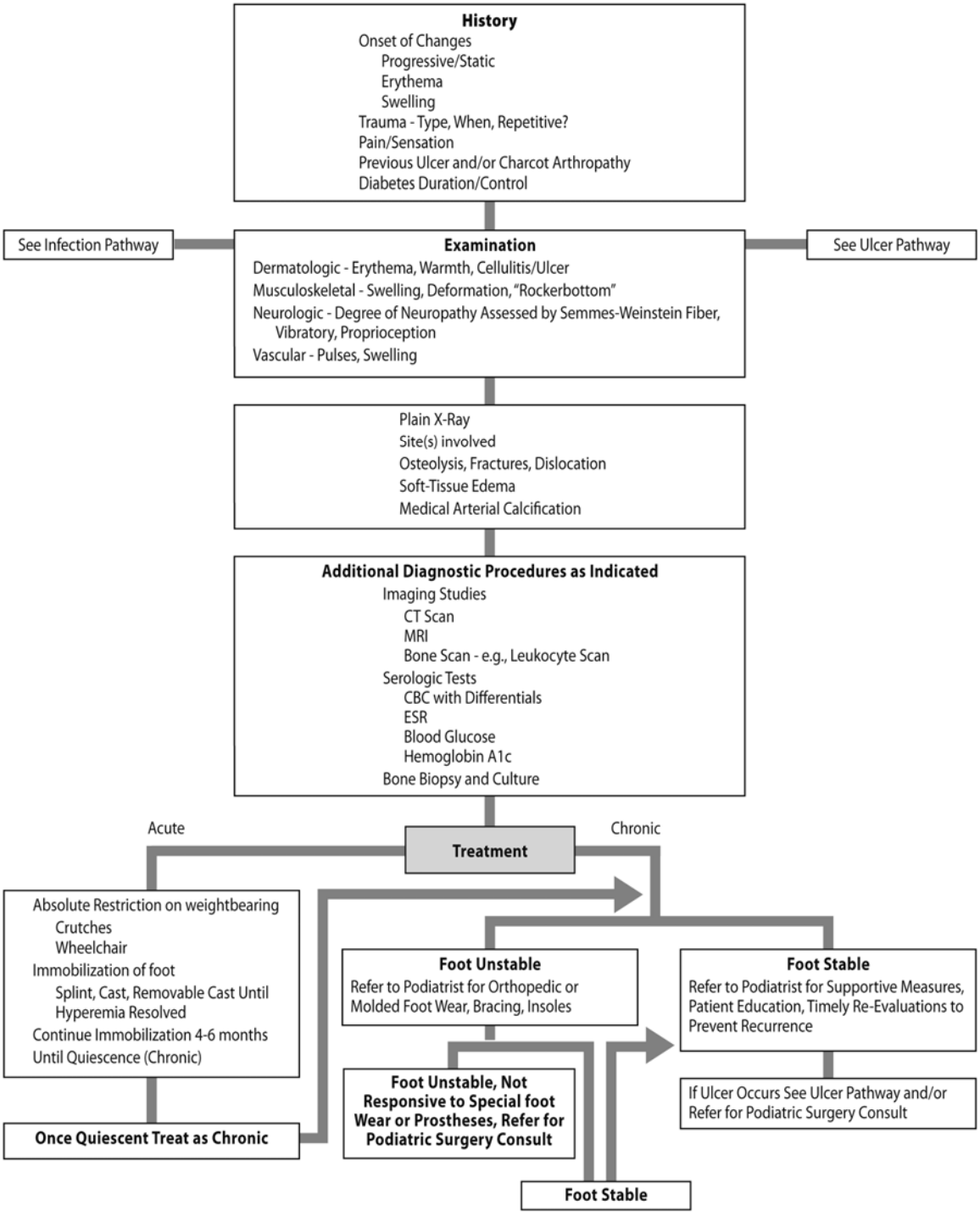
Developed by the Clinical Practice Core Committee of the American College of Foot and Ankle Surgeons (ACFAS).

Algorithm 4 **Diabetic Foot Disorders INFECTION: A Clinical Practice Pathway**



Developed by the Clinical Practice Core Committee of the American College of Foot and Ankle Surgeons (ACFAS).

Algorithm 5 **Diabetic Foot Disorders CHARCOT FOOT: A Clinical Practice Pathway**



Developed by the Clinical Practice Core Committee of the American College of Foot and Ankle Surgeons (ACFAS).

Annual Comprehensive Diabetes Foot Exam Form

Name: _____ Date: _____ ID#: _____

I. Presence of Diabetes Complications
1. Check all that apply.
❑ Peripheral Neuropathy
❑ Nephropathy
❑ Retinopathy
❑ Peripheral Vascular Disease
❑ Cardiovascular Disease
❑ Amputation *(Specify date, side, and level)*

_____

Current ulcer or history of a foot ulcer? Y____ N____

For Sections II & III, fill in the blanks with "Y" or "N" or with an "R," "L," or "B" for positive findings on the right, left, or both feet.

II. Current History
1. Is there pain in the calf muscles when walking that is relieved by rest? Y____ N____
2. Any change in the foot since the last evaluation? Y ____ N____
3. Any shoe problems? Y___ N____
4. Any blood or discharge on socks or hose? Y____ N____
5. Smoking history? Y___N___
6. Most recent hemoglobin A1c result _____% _____ *date*

III. Foot Exam
1. Skin, Hair, and Nail Condition
Is the skin thin, fragile, shiny and hairless? Y ___ N___

Are the nails thick, too long, ingrown, or infected with fungal disease? Y ___ N___

Measure, draw in, and label the patient's skin condition, using the key and the foot diagram below.
C=Callus U=Ulcer PU=Pre-Ulcer
F=Fissure M=Maceration R=Redness
S=Swelling W=Warmth D=Dryness

2. Note Musculoskeletal Deformities
❑ Toe deformities
❑ Bunions (Hallus Valgus)
❑ Charcot foot
❑ Foot drop
❑ Prominent Metatarsal Heads

3. Pedal Pulses Fill in the blanks with a "P" or an "A" to indicate present or absent.
Posterior tibial Left_____ Right_____
Dorsalis pedis Left_____ Right_____

4. Sensory Foot Exam *Label sensory level with a "+" in the five circled areas of the foot if the patient can feel the 5.07 (10-gram) Semmes-Weinstein nylon monofilament and "-" if the patient cannot feel the filament.*

Notes

Right Foot

Left Foot

Notes

IV. Risk Categorization *Check appropriate box.*

❑ Low Risk Patient
All of the following:
❑ Intact protective sensation
❑ Pedal pulses present
❑ No deformity
❑ No prior foot ulcer
❑ No amputation

❑ High Risk Patient
One or more of the following:
❑ Loss of protective sensation
❑ Absent pedal pulses
❑ Foot deformity
❑ History of foot ulcer
❑ Prior amputation

V. Footwear Assessment *Indicate yes or no.*
1. Does the patient wear appropriate shoes? Y___ N ___
2. Does the patient need inserts? Y ___ N ___
3. Should corrective footwear be prescribed? Y ___ N ___

VI. Education *Indicate yes or no.*
1. Has the patient had prior foot care education? Y __N__
2. Can the patient demonstrate appropriate foot care? Y__N__
3. Does the patient need smoking cessation counseling? Y__N__
4. Does the patient need education about HbA1c or other diabetes self-care? Y__N__

Provider Signature _____

VII. Management Plan *Check all that apply.*
1. Self-management education:
Provide patient education for preventive foot care. Date: _____
Provide or refer for smoking cessation counseling. Date: _____
Provide patient education about HbA1c or other aspect of self-care. Date: _____
2. Diagnostic studies:
❑ Vascular Laboratory
❑ Hemoglobin A1c (at least twice per year)
❑ Other: _____

3. Footwear recommendations:
❑ None
❑ Athletic shoes
❑ Accommodative inserts
❑ Custom shoes
❑ Depth shoes

4. Refer to:
❑ Primary Care Provider
❑ Diabetes Educator
❑ Podiatrist
❑ RN Foot Specialist
❑ Pedorthist
❑ Orthotist
❑ Endocrinologist
❑ Vascular Surgeon
❑ Foot Surgeon
❑ Rehab. Specialist
❑ Other: _____

5. Follow-up Care:
Schedule follow-up visit. Date: _____

MONOFILAMENT APPLICATION INSTRUCTIONS

Note: The sensory testing device used with the FOOT SCREEN is a nylon filament mounted on a holder that has been standardized to deliver a 10 gram force when properly applied. Research has shown that a person who can feel the 10 gram monofilament in the selected sites will not develop ulcers.

Instructions for sensory testing on the foot:

(1) Use the 10 gram monofilament provided to test sensation.

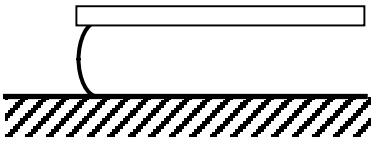
(2) The sites to be tested are indicated on the Diabetic Foot Screen Form.

(3) Apply the monofilament perpendicular to the skin's surface (see Diagram A).

(4) The approach, skin contact, and departure of the monofilament should be approximately 1 ½ seconds duration.

(5) Apply sufficient force to cause the monofilament to bend (see Diagram B).

A



B

(6) Do not allow the monofilament to slide across the skin or make repetitive contact at the test site.

(7) Randomize the selection of test sites and time between successive tests to reduce the potential for the person guessing.

(8) Ask the person to respond "yes" when the monofilament is felt and record response on the Diabetic Foot Screen Form.

(9) Apply the monofilament along the perimeter of and NOT on an ulcer site, callous, scar, or necrotic tissue.

SHOES *and* SOCKS

take 'em off!

IF YOU HAVE DIABETES

Have your doctor check your feet.

MEDIAS *y* ZAPATOS

¡Sáqueselos!

SI TIENE DIABETES

Pídale a su médico que le vea los pies.

Use this copier-ready master to create your own stickers to place on the medical record. This master is designed to be reproduced on brightly colored 1" x 2-5/8" labels from Avery.

HIGH RISK

FEET

HIGH RISK

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